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MASSACHUSETTS COASTAL BASIN KINGSTON, MASSACHUSETTS

RUSSELL POND DAM MA 00392

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

OTIC FILE COPY





DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

**MAY 1979** 

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Massachusetts Coastal Basin Kingston, Massachusetts Branch of Furnace Brook

- 20. ABSTRACT (Continue on reverse side if necessary and identify by block number)
  - -Russell Pond Dam is an earthen dam about 130 ft. long and 15 ft, high. The dam is in poor condition. The embankment contains many trees and bushes. The size classification is small and the hazard classification is significant. Investigations to determine various deficiencies of the dam are recommended.



#### DEPARTMENT OF THE ARMY

## NEW ENGLAND DIVISION, CORPS OF ENGINEERS 424 TRAPELO ROAD

WALTHAM, MASSACHUSETTS 02154

REPLY TO ATTENTION OF:

NEDED

OCT 2 1979

Honorable Edward J. King Governor of the Commonwealth of Massachusetts State House Boston, Massachusetts 02133

#### Dear Governor King:

I am forwarding to you a copy of the Russell Pond Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, Mr. Horace C. Weston, Sylvia Place Road, Kingston, Mass. 02354.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely,

Incl
As stated

MAX B. SCHEIDER

Colonel, Corps of Engineers

Division Engineer

#### RUSSELL POND DAM MA 00392

MASSACHUSETTS COASTAL BASIN KINGSTON, MASSACHUSETTS

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PHASE I INSPECTION REPORT NATIONAL DAM INSPECTION PROGRAM



### PHASE I INSPECTION REPORT NATIONAL DAM INSPECTION PROGRAM

Identification No.: MA 00392 Name of Dam: RUSSELL POND DAM

Town: KINGSTON

County and State: PLYMOUTH COUNTY, MA

Stream: BRANCH OF FURNACE BROOK
Date of Inspection: 5 December 1978

#### BRIEF ASSESSMENT

Russell Pond Dam is an earthen dam approximately 130 feet long and 15 feet high. The dam, the age of which is unknown, impounds the waters of a branch of Furnace Brook to form Russell Pond. The pond is used for conservation purposes at present; the former purpose of the pond being to supply water to a downstream mill abandoned years ago. The spillway is a man-made earth channel located approximately 300 feet west of the dam's left abutment. The channel conveys water to Upper Silver Pond which empties into Lower Silver Pond via a fish ladder. Water leaving Lower Silver Pond flows along another fish ladder to Soules Pond where the original watercourse from Russell Pond also empties.

The dam is in poor condition. The embankment contains many trees and bushes. Local depressions are present in the crest and erosion is taking place along its front edge. Active seepage is present at and adjacent to the toe of the dam. There is no formal erosion and wave protection present at the upstream face of the dam nor is there any known reservoir drain. While the outlet channel (spillway) is in better condition; trees, brush and debris are present in and along the channel.

Based on the size classification, small, and the hazard classification, significant, in accordance with the Corps of Engineers guidelines, the spillway test flood is the one quarter Probable Maximum Flood (1/4 PMF). Hydraulic analysis indicates the outlet channel can safely pass the test flood of 40 cfs, with a reservoir stage approximately three inches below the top of the dam. The maximum outlet channel capacity with the reservoir surface at the crest of the dam is 57 cfs.

Investigations to determine the long term effect of the seepage at the dam, the static stability of the dam, a plan for the clearing of trees, brush and debris from the dam and outlet channel, and a method of providing an operable reservoir drain are recommended. Recommended remedial measures include providing upstream slope protection on the embankment and the repair of eroded areas and local depressions in the embankment crest and upstream slope. The Owner should establish a formal operational procedure and maintenance program, develop a formal emergency procedure plan and warning system in cooperation with local officials and institute a program of annual technical inspections. The investigations and remedial measures should be performed within one year of receipt of the report by the Owner.

ROGER

CAMP DRESSER AND MCKEE INC.

Koger W. Wood
Roger H. Wood
Vice President

This Phase I Inspection Report on Russell Pond Dam has been reviewed by the undersigned Review Roard members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.

Joseph J. Mc Elroy

JOSEPH A. MCELROY, MEMBER Foundation & Materials Branch Engineering Division

CARNEY M. TERZIAN, MEMBER

Design Branch

. Engineering Division

Joseph W. Finegan

JOSEPH V. FINEGAN, JR., CHAIRLAN

Chief, Reservoir Control Center

Water Control Branch

Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR

Chief, Engineering Division

#### PREFACE

This report is prepared under guidance contained in the Recommended Guide-lines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I Investigations are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the test flood is based on the estimated "probable maximum flood" for the region (greatest reasonably possible storm runoff), or a fraction thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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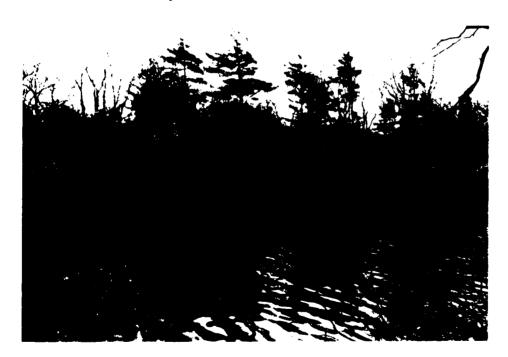
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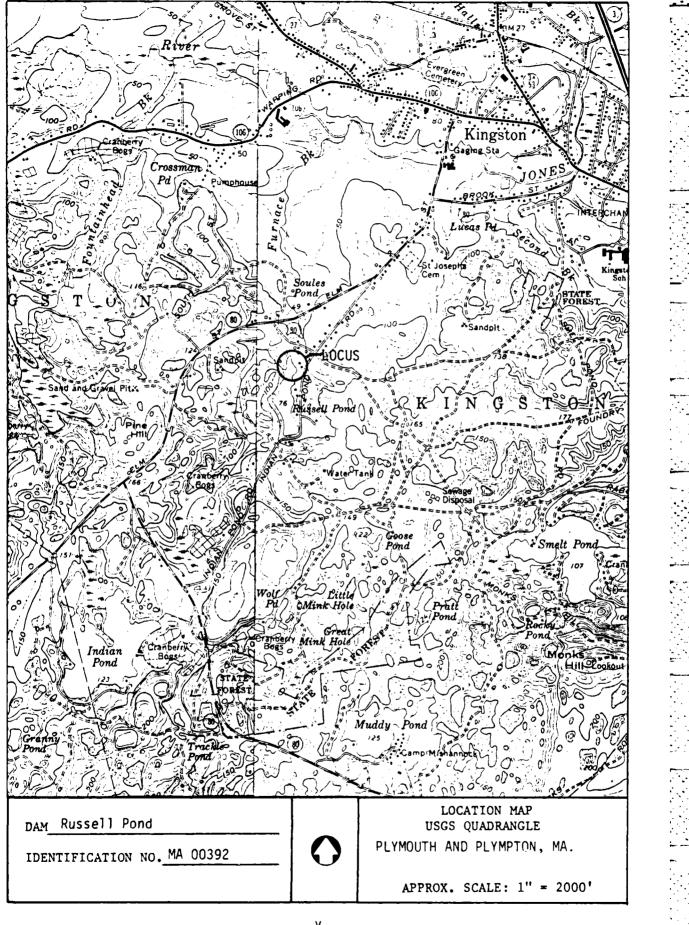
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1. Overview of upstream face of Russell Pond Dam from west side of pond.



2. Overview of upstream face of Russell Pond Dam from spillway area.



# NATIONAL DAM INSPECTION PROGRAM PHASE I INSPECTION REPORT RUSSELL POND DAM MA 00392

SECTION 1: PROJECT INFORMATION

#### 1.1 General

a. Authority - Public Law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region.

Camp Dresser & McKee Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued to Camp Dresser & McKee Inc. under letters of 12 July 1978 and 23 October 1978 from Colonel John P. Chandler, Corps of Engineers. Contract No. DACW 33-78-C-0354 has been assigned by the Corps of Engineers for this work. Haley and Aldrich, Inc. has been retained by Camp Dresser & McKee Inc. for the soils and geological portions of the work.

- b. Purpose The primary purpose of the investigation is to:
  - (1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.
  - (2) Encourage and assist the States to initiate quickly effective dam safety programs for non-Federal dams.
  - (3) Update, verify and complete the National Inventory of Dams.

#### 1.2 Description of Project

a. Location - Russell Pond Dam is located on a branch of Furnace Brook in the Town of Kingston, Massachusetts as shown on the Location Map. The dam is at the north end of Russell Pond while the earthen channel which serves as the spillway is approximately 300 feet from the left abutment of the dam along the west shore of the pond. Access to the dam and discharge channel is by cart roads from Sylvia Place Road.

#### APPENDIX A

#### INSPECTION TEAM ORGANIZATION AND CHECK LIST

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- (3) Develop a plan to clear brush and trees from the dam embankment and the lower 20 feet of the outlet channel cut slopes, including stump removal and backfilling, and the establishment of vegetative cover on exposed portions of the crest and slopes.
- (4) Locate and make operational the former reservoir drain or design and construct a method of draining the reservoir during emergencies.

#### 7.3 Remedial Measures

- a. Operation and Maintenance Procedures It is recommended that the following remedial work be undertaken by the Owner, in addition to the investigations outlined in Section 7.2, in order to correct deficiencies noted during the visual examination:
  - (1) Provide riprap or cobble slope protection on the upstream face of the dam. Restore and re-shape local eroded areas.
  - (2) Re-shape the dam crest to provide uniform freeboard and to facilitate access for maintenance and repair. The extent of the re-shaping will be subject to the results of the evaluation of actual embankment configuration under Section 7.2
  - (3) Remove debris from the outlet channel, including the fallen stones from side walls.
  - (4) Due to the presence of seepage at the downstream toe of the dam, it is recommended that, during periods of high reservoir levels and unusually heavy precipitation, the Owner provide surveillance of the dam. The outlet channel should be checked for debris at regular intervals and during periods of high pond levels due to its susceptibility to blockage.
  - (5) Establish a formal operational procedure and maintenance program, develop a formal emergency procedure plan and warning system in cooperation with local officials and institute a program of annual technical inspections.
- 7.4 Alternatives There are no recommended alternatives.

#### 7.1 Dam Assessment

- a. Condition The visual examination of Russell Pond Dam did not reveal any evidence of impending failure or conditions which would warrant urgent remedial treatment. However, because of the need for maintenance and additional investigation that is outlined hereinafter, the project is considered to be in poor condition.
- b. Adequacy of Information All of the information for the Phase I Investigation had to be obtained from visual examination and limited measurements at the site. This information has been sufficient for the purpose of this investigation, but it does not permit detailed evaluation of static stability, seismic stability and the seepage.
- c. <u>Urgency</u> The recommended additional investigations and remedial measures outlined in Sections 7.2 and 7.3, respectively, should be undertaken within one year of receipt of this report by the Owner.
- d. <u>Need for Additional Investigations</u> Additional investigations should be performed by the Owner as outlined in the following section.

#### 7.2 Recommendations

It is recommended that the Owner engage a qualified registered professional engineer to perform the following:

- (1) An investigation to determine whether or not the seepage that is occurring at the right abutment slope and at the downstream toe of the dam can have a significant effect on long-term dam stability. This would include regular monitoring of the observed seepage locations, including checks during higher-than-normal pond levels, to determine if conditions are changing with time.
- (2) Topographic survey of the dam embankment, including underwater portions, and an engineering evaluation of actual embankment configuration with respect to stability under static loading conditions. If the survey does not provide sufficient information to confirm adequate stability it may be necessary to carry out test borings and/or test excavations to determine the character of the embankment material and whether or not there is a core wall.

#### SECTION 6: STRUCTURAL STABILITY

#### 6.1 Evaluation of Structural Stability

- a. Visual Observation There was no visible evidence of dam embankment instability during the site examination on 5 December 1978. The seepage at the downstream toe of the embankment showed no evidence of active erosion or piping and is not considered to pose an immediate hazard to the stability of the downstream slope. However, the seepage could have a significant effect on the long-term stability of the dam.
- b. <u>Design and Construction Data</u> There is substantially no design or construction information on the dam embankment. Thus, theoretical analysis of the structural stability of the embankment is not possible.

The dam has apparently been stable under past static loading conditions, but whether or not the continuing seepage can cause future instability has not been determined.

- c. Operating Records There are no operating records available for the dam other than county and state inspection reports.
- d. <u>Post-Construction Changes</u> Without design or "as-built" drawings, it is not known if there have been significant post-construction changes to the embankment.
- e. Seismic Stability Russell Pond Dam is located in Seismic Zone 3. Due to the proximity of the dam to the Seismic Zone boundry line, the relatively low height of dam and the classification of the dam as having only a significant hazard potential, a seismic analysis is not considered warrented.

f. Dam Failure Analysis - Dam failure analysis was performed in order to assess the downstream hazards in the event of dam failure. A peak failure outflow of approximately 7,800 cfs was estimated based on a breach width of approximately 80 feet and with the pond level at the top of the dam (78.3 feet above NGVD). The analysis indicates that a road approximately 500 feet downstream of the dam would be overtopped by almost 4 feet, and Elm Street, approximately 1,300 feet downstream of the dam, be overtopped by a little more than half a foot. The dam failure outflow would probably cause no property damage downstream of Soules Pond and would have little or no effect on the Jones River. A total of 4 or 5 buildings downstream of the dam would probably be flooded. The potential loss of life is estimated to be a few persons. Accordingly, Russell Pond Dam is classified as having a "significant" hazard potential.

#### SECTION 5: HYDRAULIC/HYDROLOGIC

#### 5.1 Evaluation of Features

- a. General Russell Pond is formed by the Russell Pond Dam which is said to have been constructed in the nineteenth century to provide water power for a nearby mill. The dam impounds the waters of a branch of Furnace Brook. The pond level is controlled by the opening beneath a fieldstone bridge, which crosses the outlet channel. The opening is approximately 2.5 ft. wide, 2.25 ft. high and 12 ft. long. The outlet channel flows from the pond to Upper and Lower Silver ponds, the discharge from which flows to Soules Pond. Furnace Brook receives flow from Soules Pond and discharges into the Jones River.
- Design Data No hydraulic/hydrologic design data are available for the dam.
- c. Experience Data There are no records of past floods at the dam site.
- d. <u>Visual Observations</u> The pond level was approximately 8 inches above the high point in the outlet channel at the time of inspection. The outlet channel and opening beneath the bridge appeared to be in fair hydraulic condition. The crest elevation of the dam varies with the low point approximately 2.3 feet above the high point in the outlet channel.
- e. Test Flood Analysis Based on the Corps of Engineers guidelines, the recommended test flood for the size (small) and hazard potential (significant) is between the 100-year flood and one-half of the Probable Maximum Flood (PMF). Because of the relatively small size of the dam, the 1/4 PMF, which is generally greater than or equal to the 100-year flood, was adopted as the test flood. The 1/4 PMF inflow was determined using Corps of Engineers guidelines for "Estimating Maximum Probable Discharge" in Phase I Dam Safety Investigations. The watershed terrain is characterized as rolling, and a PMF inflow rate of 2,870 cubic feet per second (cfs) per square mile was adopted for the 0.16-square-mile drainage area. The resulting test flood inflow is 113 cfs.

Surcharge-storage routing of the test flood inflow through Russell Pond resulted in a peak test flood outflow of 40 cfs at a surcharge pond stage of 78.1 feet above NGVD. At this stage, which is 2.1 feet above the spillway crest, the dam will not be overtopped.

#### SECTION 4: OPERATIONAL PROCEDURES

- 4.1 <u>Procedures</u> In general, there is no established routine for the operation of the dam.
- 4.2 Maintenance of the Dam The dam and outlet channel receive minimal maintenance. There is no established formal procedure for the maintenance of the dam. Large trees grow on much of the dam, and along the outlet channel, and the center portion of the dam shows signs of erosion.
- 4.3 <u>Maintenance of Operating Facilities</u> There are no operating facilities for Russell Pond.
- 4.4 <u>Description of any Warning System in Effect</u> There is no established warning system or emergency preparedness plan in effect for this structure.
- 4.5 Evaluation A formal maintenance program, warning system and emergency preparedness plan should be established for the dam and spillway. Maintenance of the dam and spillway should be performed at regular intervals. The seepage at the toe of the dam should be kept under observation and the outlet channel checked for debris at frequent intervals.

- c. Appurtenant Structures The fieldstone bridge over the outlet channel, as shown in Photos 9 and 10, is in good condition. There is no apparent reservoir drain or other means of lowering the water level below the spillway crest.
- d. Reservoir Area The area around Russell Pond is generally wooded and lightly developed. There appears to be no structure below elevation 80.

The side slopes of the pond vary from very steep and wooded on the west to moderately steep and open on the south and east. There is no apparent potential for significant landslides into the pond which could create waves that might overtop the dam. No conditions were noted which could result in a sudden increase in sediment load in the pond.

- e. <u>Downstream Channel</u> The outlet channel to Upper Silver Pond is partly obstructed by the small waterway through the stone bridge, and by scattered trees, stumps and fallen stones from the low walls. It could have a major blockage if uprooting of one of the larger trees on the steep cut slope caused slope movement into the narrow channel.
- 3.2 Evaluation The Russell Pond Dam embankment and outlet channel appear to be performing satisfactorily at the present time. Previous inspection reports indicate that the seepage at the toe of the embankment is a long-standing condition. However, the continuing seepage, the lack of upstream slope protection, the low section of the dam crest, and the numerous large trees along the dam could provide significant potential for embankment failure under conditions of higher-than-normal water levels and high winds. The outlet channel, which is the only observed method of controlling the pond water level, is susceptible to blockage due to the constriction of the bridge, the trees on the side slopes and the present debris within the channel.

#### SECTION 3: VISUAL INSPECTION

#### 3.1 Findings

General - The visual examination of Russell Pond Dam was conducted on 5 December 1978.

In general, the dam was found to be in poor condition. Brush and large trees cover much of the embankment, and local erosion is visible in several locations. Seepage was noted at the toe of the dam. The discharge channel and spillway were found to be in fair condition.

A visual inspection checklist is included in Appendix A, and selected photographs of the project are given in Appendix C.

b. Dam - There was no obvious visual evidence of major lateral movement or settlement of the irregular dam embankment, but there has been erosion of the upstream face, and there is local seepage and a general cover of trees and brush.

The following specific items were noted during the site examination:

- (1) The dam crest and slopes have numerous trees, ranging up to 24 inches in diameter, along with scattered stumps and clumps of brush, as shown in Photos 1 through 5.
- (2) The irregular upstream face has no stone protection, and has been locally eroded to a near-vertical slope under tree roots, as shown in Photo 5.
- (3) The irregular crest varies in width and freeboard, as shown in Photos 3 and 4, inviting local overtopping and erosion in the event of unusually high water levels and high winds. At one point, toward the center of the dam, the crest is nearly a foot lower than elsewhere.
- (4) There was active seepage with rust staining at the downstream toe of the right side of the dam. Part of the flow originated at the toe where the embankment slope is steepest, but most appeared to be coming from a saturated natural slope immediately downstream from the right abutment, as shown in Photo 6. The combined flow, estimated at 1 to 2 gallons per minute, did not show evidence of soil particle movement.
- (5) Brush has been dumped over the slope at the right abutment.

#### SECTION 2: ENGINEERING DATA

- 2.1 Design Records There are no known design records for the dam.
- 2.2 <u>Construction Records</u> No records of the original construction were located.
- 2.3 Operation Records No operational records other than State inspection reports are available for the dam.
- 2.4 Evaluation Since no engineering records are available, the evaluation of the dam must be based primarily on the results of the visual examination which are detailed in Section 3.

	(4)	Test flood pool	13.3
	(5)	Top of dam	13.4
g.	Dam		
	(1)	Туре	Earth embankment
	(2)	Length	Approx. 130'
	(3)	Height	15' <u>+</u> max.
	(4)	Top width	8-10' typ., 6' min.
	(5)	Side slopes	-Irregular upstream, varies to as steep as 1.5:1 downstream
	(6)	Zoning	Unknown
	(7)	Impervious Core	Unknown
	(8)	Cutoff	Unknown
	(9)	Grout curtain	Probably none
h.	<u>Dive</u>	rsion and Regulating Tunnel	None
i.	<u>Spil</u>	lway	•
	(1)	Туре	passing through a 2.5 ft. w by 2.25 ft. h opening beneath a field- stone bridge
	(2)	Length of weir	2.5 ft.
	(3)	Crest elevation	76.0 MSL
	(4)	Gates	None
	(5)	U/S Channel	None
	(6)	D/S Channel	woodland stream
j.	Regu	lating Outlets	None known

	(0)	40 cfs @ 78.1 elev.
c.	<u>El ev</u>	ation (ft. above MSL)
	(1)	Streambed at centerline of dam63.3 (Est)
	(2)	Test flood tailwaterN/A
	(3)	Upstream portal invert diversion tunnelN/A
	(4)	Normal pool76.0
	(5)	Full flood control poolN/A
	(6)	Spillway crest76.0
	(7)	Design surcharge (Original Design)Unknown
	(8)	Top of damVaries, low point at 78.3
	(9)	Test flood design surcharge78.1
d.	Rese	rvoir
	(1)	Length of test flood pool1,730 ft
	(2)	Length of normal pool1,700 ft
	(3)	Length of flood control poolN/A
е.	Stor	age (acre-feet)
	(1)	Normal pool41.3
	(2)	Flood control poolN/A
	(3)	Spillway crest pool41.3
	(4)	Top of dam71.0
	(5)	Test flood pool68.9
f.	Rese	rvoir Surface (acres)
	(1)	Normal pool12.4
	(2)	Flood-control poolN/A
	(3)	Spillway crest12.4

- g. Purpose of the Dam Russell Pond Dam was originally constructed to provide a head of water to a downstream mill. The mill no longer exists, and the outlet is apparently discontinued. The dam currently provides a conservation/recreation pond.
- h. <u>Design and Construction History</u> There are no records of the design or construction of this dam. The owner indicated that the dam was probably built in the nineteenth century.
- i. Normal Operational Procedure There is no established procedure for the operation of the dam. The condition of the spillway, discharge channel and main dam embankment indicates that little maintenance is performed on a routine basis. Use of the dam by the public in the past resulted in erosion of the embankment. Public use of the dam is now prohibited.
- 1.3 Pertinent Data There are no known elevations previously established at the dam site. Elevations used in this report are on NGVD (National Geodetic Vertical Datum), formerly referred to as Mean Sea Level Datum (MSL). The water surface elevation (76 feet above NGVD) shown on the USGS Quadrangle, Plymouth, Mass., 1962, was adopted as the spillway crest elevation. All other elevations given in this report pertaining to the dam site were estimated from the assumed spillway crest elevation.

- a. <u>Drainage Area</u> The drainage area tributary to the dam site is 0.16 square mile. The rolling terrain surrounding Russell Pond is moderately forested and lightly developed. Russell Pond accounts for approximately 12 percent of the total drainage area.
- b. <u>Discharge at Dam Site</u> There are no records of discharges at the dam site.
  - (1) Outlet works size-----2.5 ft. wide vegetated channel
  - (2) Maximum known flood at damsite------Unknown
  - (3) Ungated spillway capacity at top of dam 57 cfs @ 78.3 elev.
  - (4) Ungated spillway capacity at test flood elevation 40 cfs @ 78.1 elev.
  - (5) Gated spillway capacity at normal pool elevation-----N/A
  - (6) Gated spillway capacity at test flood elevation-----N/A
  - (7) Total spillway capacity at test flood elevation 40 cfs @ 78.1 elev.

b. Description of Dam and Appurtenances - Russell Pond Dam consists of an earth embankment approximately 130 ft. long, with no spill-way or outlet structure at the dam location. There is a separate outlet channel cut through a glacial esker formation on the west side of Russell Pond to the adjacent Upper Silver Pond.

The dam embankment has a height of about 15 ft. and a crest that is typically 8 to 10 ft. wide. The upstream slope is irregular, and the steepest portion of the downstream slope is approximately 1.5 horizontal to 1 vertical. Both the crest and the slopes are vegetated, there being no riprap or other erosion protection. Each abutment consists of a gradual transition to wooded natural ground.

The outlet channel is about 3 to 5 ft. wide at the bottom and has steep wooded earth slopes cut at approximately 1.5 to 1. Where the cut is deepest, there are low, 2- to 3-ft.-high rock walls at the bottom. A small fieldstone bridge crosses the channel close to Russell Pond. The bridge is approximately 12 feet wide and spans approximately 4 feet across the outlet channel.

No other outlet, controlled or uncontrolled, is known to exist. At one time there probably was a conduit leading north from the left abutment of the dam to a mill or waterwheel approximately 200 feet away on the south shore of Lower Silver Pond. The blocked outlet works is still present at Lower Silver Pond, and a slight, linear depression in the ground extends from the structure almost to the dam at Russell Pond. No evidence of an intake structure was observed at Russell Pond. Although none is evident at present, there probably was a pond drain, as reports indicate that, years ago, the pond was drained during the summers.

- c. <u>Size Classification</u> Russell Pond dam has a height of approximately 15 feet and a storage capacity of 71 acre-feet at the top of the dam. According to guidelines established by the Corps of Engineers, the dam is classified in the small category.
- d. <u>Hazard Classification</u> Based on the results of the dam failure analysis included in Section 5 of this report, two roads and a few buildings would be affected by a dam failure. The estimated loss of life would be a few persons. It is recommended, therefore, that the dam be classified in the significant hazard category.
- e. Ownership The dam is owned by Mr. Horace C. Weston, Sylvia Place Road, Kingston, Massachusetts 02364 (phone 617-585-2524).
- f. Operator Mr. Horace C. Weston, the Owner, also serves as the Operator of the dam.

# VISUAL INSPECTION PARTY ORGANIZATION NATIONAL DAM INSPECTION PROGRAM

WATER SURFACE ELEVATION UPSTREAM: 8" above spillway crest  STREAM FLOW: 5.4+ cfs (s = 0.0045, n = 0.035, TW = 5'; D = 0.67')  INSPECTION PARTY:  1. Roger H. Wood - Structural & Operation  2. Charles E. Fuller - Hydraulics & Hydrology  3. Joseph E. Downing - Ass't. Hydraulics & Hydrology  4. William C. Rowe - Ass't. Structural  5. Peter L. LeCount (H & A) Soils  6.  PRESENT DURING INSPECTION:  1.	DAM: Russell Pond
TIME: 0800  WEATHER: Partly Cloudy - 50° F  WATER SURFACE ELEVATION UPSTREAM: 8" above spillway crest  STREAM FLOW: 5.4+ cfs (s = 0.0045, n = 0.035, TW = 5'; D = 0.67')  INSPECTION PARTY:  1. Roger H. Wood - Structural & Operation  2. Charles E. Fuller - Hydraulics & Hydrology  3. Joseph E. Downing - Ass't. Hydraulics & Hydrology  4. William C. Rowe - Ass't. Structural  5. Peter L. LeCount (H & A) Soils  6. PRESENT DURING INSPECTION:  1.	DATE: December 5, 1978
WATER SURFACE ELEVATION UPSTREAM: 8" above spillway crest  STREAM FLOW: 5.4+ cfs (s = 0.0045, n = 0.035, TW = 5'; D = 0.67')  INSPECTION PARTY:  1. Roger H. Wood - Structural & Operation  2. Charles E. Fuller - Hydraulics & Hydrology  3. Joseph E. Downing - Ass't. Hydraulics & Hydrology  4. William C. Rowe - Ass't. Structural  5. Peter L. LeCount (H & A) Soils  6.  PRESENT DURING INSPECTION:  1.	TIME: 0800
STREAM FLOW: 5.4+ cfs (s = 0.0045, n = 0.035, TW = 5'; D = 0.67')  INSPECTION PARTY:  1. Roger H. Wood - Structural & Operation  2. Charles E. Fuller - Hydraulics & Hydrology  3. Joseph E. Downing - Ass't. Hydraulics & Hydrology  4. William C. Rowe - Ass't. Structural  5. Peter L. LeCount (H & A) Soils  6.  PRESENT DURING INSPECTION:  1.	WEATHER: Partly Cloudy - 50° F
INSPECTION PARTY:  1. Roger H. Wood - Structural & Operation  2. Charles E. Fuller - Hydraulics & Hydrology  3. Joseph E. Downing - Ass't. Hydraulics & Hydrology  4. William C. Rowe - Ass't. Structural  5. Peter L. LeCount -(H & A) Soils  6.  PRESENT DURING INSPECTION:  1.	WATER SURFACE ELEVATION UPSTREAM: 8" above spillway crest
1. Roger H. Wood - Structural & Operation  2. Charles E. Fuller - Hydraulics & Hydrology  3. Joseph E. Downing - Ass't. Hydraulics & Hydrology  4. William C. Rowe - Ass't. Structural  5. Peter L. LeCount (H & A) Soils  6. PRESENT DURING INSPECTION:  1.	STREAM FLOW: $5.4 + cfs$ (s = 0.0045, n = 0.035, TW = 5'; D = 0.67')
2. Charles E. Fuller - Hydraulics & Hydrology  3. Joseph E. Downing - Ass't. Hydraulics & Hydrology  4. William C. Rowe - Ass't. Structural  5. Peter L. LeCount (H & A) Soils  6  PRESENT DURING INSPECTION:  1	INSPECTION PARTY:
3. Joseph E. Downing - Ass't. Hydraulics & Hydrology 4. William C. Rowe - Ass't. Structural 5. Peter L. LeCount (H & A) Soils 6. PRESENT DURING INSPECTION: 1.	1. Roger H. Wood - Structural & Operation
4. William C. Rowe - Ass't. Structural  5. Peter L. LeCount (H & A) Soils  6. PRESENT DURING INSPECTION:  1.	2. Charles E. Fuller - Hydraulics & Hydrology
5. Peter L. LeCount (H & A) Soils 6. PRESENT DURING INSPECTION:	3. Joseph E. Downing - Ass't. Hydraulics & Hydrology
PRESENT DURING INSPECTION:  1	4. William C. Rowe - Ass't. Structural
PRESENT DURING INSPECTION:  1	5. Peter L. LeCount (H & A) Soils
1	6
	PRESENT DURING INSPECTION:
	1
2	2
3	
4	

### VISUAL INSPECTION CHECK LIST NATIONAL DAM INSPECTION PROGRAM

DAM: Russell Pond DATE: 5 December 1978 EMBANKMENT: Dam CHECK LIST CONDITION 1. Upstream Slope a. Vegetation a. Brush, trees→15" dia., stumps, b. Sloughing or Erosion grass & weeds. c. Rock Slope Protection b. Irregular slope, locally eroded Riprap Failures nearly vertical under tree roots. d. Animal Burrows c. None d. None observed 2. Crest a. Vegetation b. Sloughing or Erosion a. Grass, trees, brush c. Surface cracks b. Low between rocks at possible old d. Movement or Settlement spillway. c. None evident 3. Downstream Slope d. Not evident because irregular. a. Vegetation b. Sloughing or Erosion c. Surface cracks a. Brush, trees→24" dia., few stumps d. Animal Burrows (leaf covered) e. Movement or Cracking near b. Steep slope in seepage area may have toe sloughed in past. f. Unusual Embankment or c. None evident Downstream Seepage d. None observed g. Piping or Boils e. Flat slope below steep in seepage h. Foundation Drainage Features area may reflect past soil mov't. i. Toe Drains f. Extensive seepage & saturated soil in area on right side that appears 4. General to be natural slope; brush dumped a. Lateral Movement over upper part of slope. b. Vertical Alignment g. Seepage areas show stain, but no c. Horizontal Alignment indication of active soil mov't. d. Condition at Abutments and h., i. None at Structures e. Indications of Movement of Structural Items a., b., c. Irregular shape obscures f. Trespassing alignment and any possible evidence g. Instrumentation Systems of movement. d. Embankment blends into natural ground. e. Rocks below slope may have been dislodged from old structure (or may have been used in old repair). f. Scattered cans & trash, minor g. None

#### VISUAL INSPECTION CHECK LIST NATIONAL DAM INSPECTION PROGRAM

	24.2		
DAM: Russell Pond	DATE: 5 Dec 1978		
SPILLWAY:	LOUINTTION		
CHECK LIST .	CONDITION		
<ol> <li>Approach Channel</li> <li>General Condition</li> <li>Obstructions</li> <li>Log Boom etc.</li> </ol>	1. a. Good b. Brush on banks c. None		
2. Weir a. Flashboards b. Weir Elev. Control (Gate) c. Vegetation d. Seepage or Efflorescence e. Rust or Stains f. Cracks g. Condition of Joints h. Spalls, Voids or Erosion i. Visible Reinforcement j. General Struct. Condition  3. Discharge Channel a. Apron b. Stilling Basin c. Channel Floor d. Vegetation e. Seepage f. Obstructions g. General Stuct. Condition  4. Walls a. Wall Location (1) Vegetation (2) Seepage or Efflorescence (3) Rust or Stains (4) Cracks (5) Condition of Joints (6) Spalls, Voids or Erosion (7) Visible Reinforcement (8) General Struct.Condition  5. Spillway Bridge	5. Fieldstone bridge covered with earth. Approximately 12 feet wide and span-		

## VISUAL INSPECTION CHECK LIST NATIONAL DAM INSPECTION PROGRAM

DAM:	Russell Pond	DATE: 5 Dec 1978
OUTLE	T WORKS:	
CHECK	LIST	CONDITION
a. b. c. d.	olet Obstructions Channel Structure Screens Stop Logs Gates	1., 2., 3., 4. There was no observed reservoir drain, outlet gates or trans mission line from the pond. There was no observed method of lowering the water level in the pond.  There is an indication that at one time there was a conduit or channel
a. b. d. e.	ontrol Facility Structure Screens Stop Logs Gates Conduit Seepage or Leaks	extending from the left abutment of the dam to a former structure, probably a mill, on the southeast shore of the second pond downstream. The remains of the structure indicate that it was a small building constructed of rubble quarry stone probably construct ed in 1800. There is evidence that
a. b. c.	utlet Structure Erosion or Cavitation Obstructions Seepage or Leaks	the drop in water surface occurred within the building. The outlet channel is still present but is now blocked with debris. No flowing water was observed at the structure. There is a depression in the ground from
a. b. c. d.	chanical and Electrical Crane Hoist Hydraulic System Service Power Emergency Power Lighting Lightning Protection	this structure which leads almost to Russell Pond indicating a filled-in channel, collapse of an underground conduit or loss of earth into a conduit. No indication of an inlet or former intake was observed at Russell Pond.

APPENDIX A-4

#### APPENDIX B

#### LIST OF AVAILABLE DOCUMENTS AND PRIOR INSPECTION REPORTS

Page No. LIST OF AVAILABLE DOCUMENTS None Available PRIOR INSPECTION REPORTS <u>By</u> Date August 1936 Plymouth County Engineering Department B-1 B-1 Plymouth County Engineering Department September 1938 B-1 February 1939 Plymouth County Engineering Department B-1 July 1941 Plymouth County Engineering Department April 1943 Plymouth County Engineering Department B-1 11y 1945 Plymouth County Engineering Department B-1 Plymouth County Engineering Department B-1 October 1949 Plymouth County Engineering Department B-1 September 1951 B-1 Plymouth County Engineering Department February 1953 Plymouth County Engineering Department B-1 December 1954 Plymouth County Engineering Department B-1 May 1957 September 1959 Plymouth County Engineering Department B-1 September 1961 B-1 Plymouth County Engineering Department November 1963 Plymouth County Engineering Department B-1 B-1 Plymouth County Engineering Department December 1965 November 1967 B-1 Plymouth County Engineering Department B-1 October 1969 Plymouth County Engineering Department March 22, 1974 March 17, 1976

Mass. Department of Public Works

Mass. Department of Public Works Mass. DPW - Description of Dam

April 15, 1974

B-3 B-6

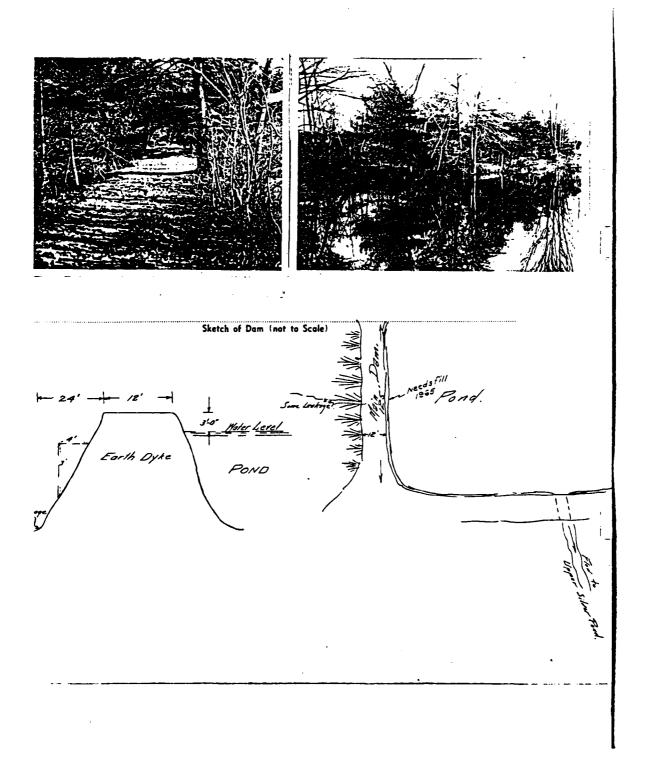
8-9

DAM NO. 79

## COUNTY OF PLYMOUTH, MASSACHUSETTS ENGINEERING DEPARTMENT

INSPECTION OF DAM AND RESERVOIRS

Inspector Officer of House Date Aug. 1936 City or Town Kingston
Owner Anna Cooley Estate & Annie L. Brensters Reservoir
Owner Anna Cooley Estate & Annie L. Brensters Reservoir.
Material and Type Earth Dyke.
Maximum Head in Feet (Full Pond Level to Bottom of Spillway) 16-6
Length 125 feet Width 12 feet
Area of Watershed 2 Sq. Miles. Capacity 22,000,000 Gallons
Length of Overflow or Spillway None in Sam. Outlets (Pipes or Flumes)
Brook outlet an M. W. side (not then down) to upper Silver Fond
Dam Constructed by
Recent Repairs
Evidence of Leakage Some Leakage at base of dam. Not serious at this time.
Condition Generally good
Topography of Country Below Series of Ponds and Somes Fiver Valley - Irregular.
Nature, extent, proximity, etc. of buildings, roads or other property in danger if failure should occur
Failure would wash out Elm St. Ind new cut-off, carrying out Soule's
Pond. Trobably no damage to ony buildings
Remarks and Recommendations This dam closes the old water course running the
Water into Upper Silver Pond. Present outlet of ample capacity.
Unchanged Sept. 1938 of Feb. 1939. Vachanged July 1944 Hachanged
April, 1943. Uncharged July, 1945. Washough October 1947. Sound-no change Sept. 1951.
1. cronges - Sound Fab. 1953, Good - no change Dec. 1954. No changes - good Many 1957
No change - good Sept. 1959. Good-some trees down on Jam Sept. 1961. Good-New 1963.
Fain-Needs fill an main dam Sec. 1965. Fain-still needs fill Nov. 1967. Fain-needs
fiiles in 185 Oct. 1969.



APPENDIX B-2

		INSPEC	CTION REPOR	T - DAM	S AND RES	ERVOIRS	
1.	Location	1: <del>*Clo</del> y/'	Fown King	storz	Dam No	7-12-1	45-1
	Name of	Dam Ru	51211 10	ind	_Inspect=	d by: 10 d	Harrison
							3-22-74
2.	Owner/s:	: Per: Ass	sessors		_Prev.Ins	spection	
			Deeds				
	1. Hora	ice C.L	Verton	Intian	Post	road Kin	gsten Mass. Tel.No.
	Name		St.& No.	Cit	y/Tewn	State '	Tel.No.
	Name		St.& No.	Cit	y/Town	State	Tel.No.
	Name		St.& Na.	Cit	y/Town	State	Tel.No.
.3.	Caretake by abser	er: (if any	y) e.g. sup r, appeinte	erinten	dent, pla lti owner	ant manager,	appointed
	Name		St.& No.	Cit	y/Town	State	Tel.No.
5.	1.	Minor	: (if dam s		2. Mod	letely)* lerate sastrous	
						s (future de	velopment)
6.						Manual	
						s; <del>_</del> _	
	Comment:						_
Het o	on N.W.	ile (no	t through a	lan) fo	Lyper	Eline Place	<u>f through brod</u> Land, Dantz-12-1
7.	Upstream	n Face of	Dam: C	Conditio	n:		
	C	Conditions	s:				
		1. Good			2. Min	or Repairs_	
		3. Majon	r Repairs_		4. Urg	gent Repairs	·
	Commer	its: <i>Dyk</i>	e needi t	Cil ia	иррегов.	milit er	Edjec wi
							Louk
		,,,	1	•			

8. Dewnstream Face of Dam:	Dam No. 2-12-145-1
Condition: 1. Go•d	
<ol><li>Major Repairs_</li></ol>	4. Urgent Repairs
Comments: Large free a	brush need cotting
***************************************	
9. Emergency Spillway: None.	
Condicion: 1. Good	2. Minor Repairs
	4. Urgent Repairs
Commence: Drove Corner on A	1. W. Side (not through dom)
to Upper dilvia Place Fo	nd.
10. Water Level at Time of Inspection:	
·	
ft. above be	alow top of dam
principal spillway c	other
22 Comment of Deficiencies Noted	
11. Summary of Deficiencies Noted:	mant. Vola managari
Animal Burrows & Washouts	ment Yel - numerous
Damage to Slopes or Top of Dam_	No
	No
-	No
Evidence of Pining	$\mathcal{N}_{\mathcal{O}}$
Frasian Val - Cl - Taber	1 - m delle main dyke.
Leaks	No.
Trash and/or Debris Impeding Flo	
Clogged or Blocked Spillway	<del></del>
	775
Other	

12. Remarks & Recommendations: (Fully Explain)

4. Unsafe\_\_

This dam closed the all water course The water is now
espering into Upper Silvia Place Fend via brook outlet
on N. W. side (See Sketch)
Note. If this down failed, 5t homes plus Old Elm St
could be flooded out.
Dyke has not been maintained for many years. Numerios
large trees & brush both faces should be out. Eresion
in approx, center of dyte mentioned in County Records (1965
Att bes not been filled
13. Overall Condition:
- 1. Safe
2. Miner Repairs Needed
3. Conditionally Safe - Major Repairs Needed

5. Raservoir Impoundment no Longer Exists (explain)
Recommend Removal from Inspection List\_\_\_\_\_\_

Location: CIE	Town King to	Dam No.	-12-14.	5-1
Name of Dam	Passell Food	Inspected by:	K.B. Horn	GOBAR
			etion: <u>3 - /</u>	
Owner/s: Per:	Assessors	Prev. Inspect	ر <u>ہے۔ تی</u>	2 - 74
Reg.	of Deeds	Pers. Contact		
	C /1/2/2007			Vinita
Name	St. & No.	City/Town	State	Tel. No.
<del></del>		ai - /m		
Name	SE. & NO.	City/Town	State	Tel. No.
Name	St. & No.	City/Town	State	Tel. No.
	any) e.g. superin			
		•		
No. of Picture	s taken:	<u> </u>		
	s taken:rd: (if dam should		)*	
Degree of Haza	<del></del>	fail completely		
Degree of Haza  1. Minor  3. Sever	rd: (if dam should	fail completely  2. Moderate  4. Disastro	us	
Degree of Haza  1. Minor  3. Sever *This rating m	rd: (if dam should	fail completely  2. Moderate  4. Disastrouse changes (fut	us_ ure developmen	
Degree of Haza  1. Minor  3. Sever *This rating m	rd: (if dam should re re ray change as land of	fail completely  2. Moderate  4. Disastro use changes (fut	us ure developmen al —	
1. Minor 3. Sever *This rating m	rd: (if dam should  re ray change as land of  Automatic  Operative: Yes	fail completely  2. Moderate  4. Disastro use changes (fut  Manu-	us ure developmen al	t)
1. Minor 3. Sever *This rating m Outlet Control	rd: (if dam should  re lay change as land  cha	fail completely  2. Moderate  4. Disastro use changes (fut  Manu  No  1- Alafar fa	us_ure_developmen al	cly Throng
1. Minor 3. Sever *This rating m Outlet Control Comments:	rd: (if dam should  re lay change as land  re lay change as land  operative: Yes  con Alil. Cide	fail completely  2. Noderate  4. Disastro use changes (fut  Manu  No  1- (1)- fer for	us ure developmen al	ely Throng
1. Minor 3. Sever *This rating m Outlet Control Comments:	rd: (if dam should  re ray change as land of  Automatic  Operative: Yes  Corr Al 22. Side  of Dam:	fail completely  2. Noderate  4. Disastro use changes (fut  Manu  No  1- (1)- fer for	us ure developmen al	ely Throng
1. Minor 3. Sever *This rating m Outlet Control Comments: \( \sum_{\text{int}} \) Upstream Face Conditi	rd: (if dam should  re lay change as land of  the control of parties are should  Operative: Yes  Control of Dam:	fail completely  2. Noderate  4. Disastro use changes (fut  Manu  No  1- Marter fact Coof thro	us ure developmen al  Saving fre upp Jarn) and Marn	ely Throng to Upper 7-12-145
1. Minor 3. Sever *This rating m Outlet Control Comments:	rd: (if dam should  re lay change as land of  the should of lay change as lay chan	fail completely  2. Noderate  4. Disastro use changes (fut  — Manu  — No  — No  — La fer face  Crof Thro  2. Minor	us_ ure developmen al  Volume fre vap Jarn) ad Dam*  Repairs	ely Throng to Upper 7-12-145
Degree of Haza  1. Minor  3. Sever *This rating m  Outlet Control  Comments: \( \subseteq \)  Upstream Face  Conditi  1. Co  3. M	rd: (if dam should  re  tay change as land of  the control of the control  of Dam:  cons:  cood  dajor Repairs	fail completely  2. Moderate  4. Disastro use changes (fut  Manu  No  1- Martinet far far  You Place far  2. Minor  4. Urgen	us ure developmen al  Service for apr Jarra  Repairs  t Repairs	c/ Throng to Upper 7-12-145
Degree of Haza  1. Minor  3. Sever *This rating m  Outlet Control  Comments: \( \subseteq \)  Upstream Face  Conditi  1. Co  3. M	rd: (if dam should  re lay change as land of  the should of lay change as lay chan	fail completely  2. Moderate  4. Disastro use changes (fut  Manu  No  1- Martinet far far  You Place far  2. Minor  4. Urgen	us ure developmen al  Service for apr Jarra  Repairs  t Repairs	c/ Throng

	Dam No. 7-12-145-1
8 .	Downstream Face of Dam:
	Conditions:
	1. Good 2. Minor Repairs
	3. Major Repairs 4. Urgent Repairs
	Comments: Some as existence force.
9.	Emergency Spillway: //ore
	Conditions:
	1. Good 2. Minor Repairs
	3. Major Repairs 4. Urgent Repairs
	Comments: Brook notlet on N. 113. side of Pord
	to Upper Mina Place Fond ( Dam# 7-12-145-3
10.	Water Level at Time of Inspection: (of lowest point at dom)
	1.0 ftabovebelow / top cf dam.
	principal spillwayother
11.	Summary of Deficiencies Noted:
	Growth (Trees & Brush) on Embankment
	Animal Burrows & Washouts
	Damage to Slopes or Top of Dam
	Cracked or Damaged Masonry No
	Evidence of Scepage Vest in line with low print of Spec
	Evidence of Piping No.
	Erosion / es - middle of dyke
	Leaks
	Trash and/or Debris Impeding Flow
	Clogged or Blocked Spillway
	Other

INSPECTION REPORT - DAMS AND RESERVOIRS

.2.

	INSPECTION REPORT - DAMS AND RESERVOIRS (7-12-145-1) .3.
	Dam No.
.2.	Remarks & Recommendations (fully explain)
	As pres reported This days alosed the old muter
	As pres reported This dura closed the old water assure, Water new renains into ligger lilies
	Pand in brook outlet to same
	No work has been done on this dom since
	previous report of 3-22-74. Large trees &
	boush still need sotting I ended area in
	The center of the dike his existed since 1965
	The Color of the signed find sittles of the color find
	· · · · · · · · · · · · · · · · · · ·
.3.	Overall Condition:
	1. Safe
	2. Minor Repairs Needed
	3. Conditionally Safe - Major Repairs Needed
	4. Unsafe
	5. Reservoir Impoundment no Longer Exists (explain)
	J. Reservoir impostinuent no Longer Exists (explain)

#### DESCRIPTION OF DAM

	DISTRICT_		
Submitted by	B. Horrison 1	Nam No. 7-12	145-1
Date	74	tity/Town King	ston_
			sell Pond
1. Location: Topo S	Sheet No. 4.5 /2	<del></del>	
Provide $8\frac{1}{2}$ " x lclearly indicat	l" in clear copy o	of topo map with	location of Dam
2. Year Built <u>Uni</u>	Your Year/s of	Subsequent Repa	irs None
3. Purpose of Dam:	Water Supply	Recreat Other	ional - Change course of flow.
4. Drainage Area:	<u>2</u> _Sq.Mi		Acres
5. Normal Ponding A	rea:	Acres	Ave.Depth
Impoundment: _	22,000,000	Cals	Acre Ft.
	Dwellings Located		or Reservoir
Slopes: Upst Down	m: Length <u>/2</u> ream Face <u>/2</u> stream Face <u>24</u> h Across Top <u>/2</u>	tto A wide	<del></del>
ć.	f Dam by Material:		
Classification o			
	Conc. Masonr	ySt	cone Mason

MP ORESSER & MCKEE INC.	CLIENT COF PROJECT Dam Ins DETAIL RUSSELL	rection Pond Dam	DATE CHECKED.	380-5-14 5/4/19 JED	DATE_	4 of 6 4/18/79 ?FH
	tage - Dischar	ge Chara	acteristic	s of Ru	 155ell Poi	nd
	itlet Spillwa					
	Below El. 78	3.3, open	channel	flow Q	= 1.486AR	2/3 5 1/2
	Above E1. 78 Assume in C = [ + c	3, orifice	flow because	Q = CA / downstream	29 H_ n_slope_is_	steep.
· · · · · · · · · · · · · · · · · · ·	- C =   + C	0.4 R <sup>2.3</sup> + 3	R1.15	= 0.8	3	
	76.0 77.0	H (ft)	Q (cfs)			
	78.0	2.0	31			
	80.0 81.0 82.0	5.0	- 75 84 92		<del></del>	
Da	r Low Po			Q=CLH	3/2	2.5
	Elev.	Too Width (ft.	Am L (ft)	H (ft)	Q(cfs)	
<del> </del>	78.3 80.0	210	10.5	1.7	582	
	81.0	240			_/,330	
	82.0	340	170	3.7	3.025	
			1,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	<u></u>	_ر	1
	ad Above O	utlet Spil	11 way	Q = CLH	3/L C=	2.5
		T 11.14/11	1/1 / ///	11 772	Q (cfs)	i
<del>-                                    </del>	81.0	Top W. JH. (H)	WeirL (FI)	H (†I)	W (EFI)	- <del> - - -</del>
	820		16.5	<del></del>	41	
		1 1			1 1 1 1 1	
5u	mmary					
		1	F T T T			
. 5 .				Qual	QTOTAL	
	76.0	[ '0	0	0		
	1 77:0	13	0		13	<del></del>
	78-0	3/	0		31	
	78.3	57	. 0	. 0	57	
	80.0	75	582	0	_657	<u>-</u>
ــــــــــــــــــــــــــــــــــــــ	81.0	84	1,330	0	1,414	
	82.0	92	3,025	41	3,158	
		+1			<del>                                     </del>	- <del> </del>
	4 - 1 - 1 - 1 - 1 - 1	1	ļ			
	<del></del>	<u></u>	لـــــــــــــــــــــــــــــــــــــ	بلبلبلبل.	<u> </u>	

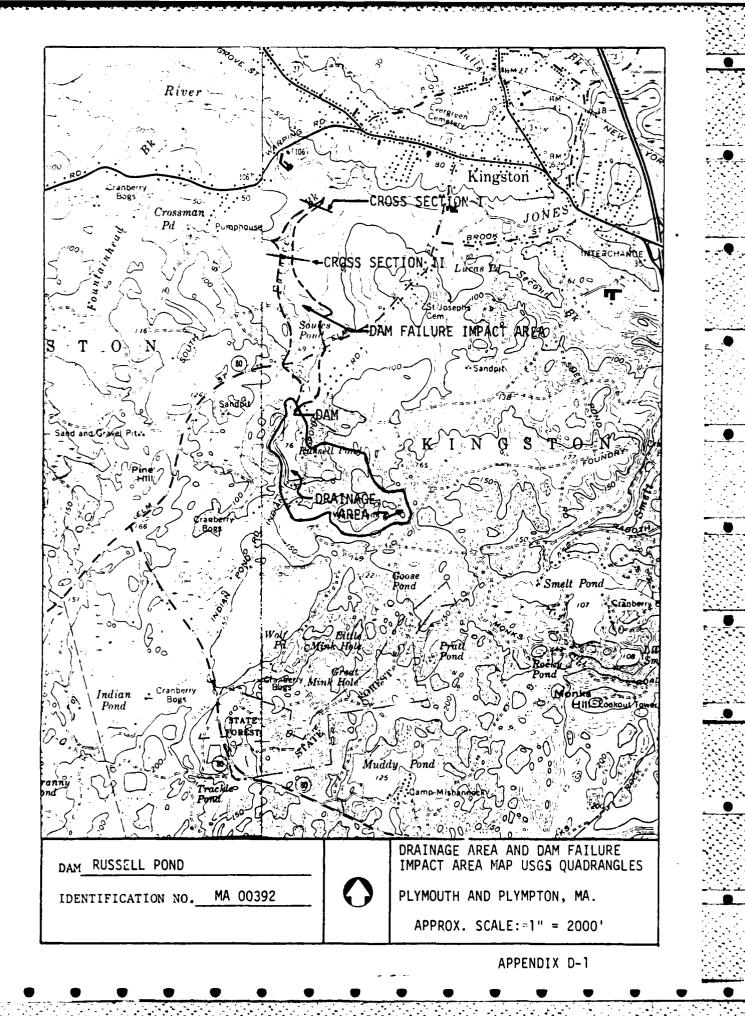
UMP ORESSER & MOKEE INC.	CLIENT COE PROJECT Dam Inspection DETAIL RUSSE !! Pond Dam	JOB NO 380 - 5 - 14  DATE CHECKED 5/H/79  CHECKED BY JED	PAGE 3 of 6 DATE 4/7/79 COMPUTED BY PEH
Fo	ourth downstream reac	h: From Cross-Section	n 2 to Coss-Section 1
	Qp = 2061 efs (Fr		
	Stage in 4th reach wis	hen outflow is 2061 El. 20.80 is 8.4	cfs is El. 20.80
-	$Q_{p_2} = 2061 \left(1 - \frac{8.4}{2.8}\right)$	« O efs	
	Stage in 4th reach who Storage " " at	en outflow is Ocf. El. 20 15 0 00	s is El. 20 oft = V2
	$V_3 = \frac{8.4 + 0}{2} = 4.2 ac$		
,	$V_4 = \frac{4.2 + 0}{2} = 2.1 \text{ ac}$	•f#:	
· · · · · · · · · · · · · · · · · · ·	$Q_{p_4} = 206 i \left(1 - \frac{2 \cdot i}{2 \cdot 8}\right) = 5$	515 cfs Outflo	w from 4th reach
	Stage in 4th reach wh	en outflow is 515	cfs is El. 20.2
	No buildings affected 1		
	Dam break wave will he on the Jones River, ap of Cross-Section 1.		
· · · · · · · · · · · · · · · · · · ·			
Dav ma po:	n failure analysis indi y be affected by dar tential lass of life is	cates that 4 or 5 m-break wave. a few persons.	buildings Estimated
	SIGNIFICANT HAZARO		
IE	ST FLOOD: 100 Yr. to Y	PMF Range; U	Ise 1/4 PMF
	ainage area of Russe rrain is rolling.	•	
	st Flood = (1/4)(2870 °		
	PMF Runoff Volume :		

APPENDIX D-4

CAMP DRESSER & MCKEE INC	CLIENT COE JOB NO 380-5-14 PAGE 2 of 6
	PROJECT Dam Inspection DATE CHECKED 5/4/79 DATE 4/17/79
	DETAIL RUSS ell Pand Dam CHECKED BY JED COMPUTED BY PFH
	Checker of Land Company
<.	and downstand model. From 1st downton - 11 E1 <+
Se	cond downstream reach: From 1st downstream road to Elm St.
	O ELLI L LE 154 MIN MANAGEMENT MANAGEMENT
	Qp = 5646 cfs (From 1st reach)
<del></del>	a tara da anta a tanàna dia mandria dia dia dia dia dia dia dia dia dia d
•	Stage in 2nd reach when outflow is 5646 of is El. 50.57 Storage " " at El. 50.57 is 6.3 acft. = V,
	Storage " " " at El. 50.57 is 6.3 acft. = V.
	Q = 5(4) (1 - 6.3) = 3840 Note: 19.14c ft is the storage
	Qp2 = 5646 (1 - 6.3) = 3840 (Note: 19.7 acft. is the storage)
· · · · · · · · · · · · · · · · · · ·	Stage in 2" reach when outflow is 3840 ets is E1 30,38
	Stage in 2nd reach when outflow is 3840 cfs is El. 50.38 Storage " at El 50.38 is 5.4 ac. ft. = V2
	and the control of th
	$V_3 = \frac{6.3 + 5.4}{2} = 5.8$ acft
	2
	/ 50
	Qp2 = 5646 (1 - 5.8) = 3984 cfs Outflow from 2nd reach
	19.7)
	• •
	Stage in 2nd reach when outflow is 3984 cfs is El. 50.39
	2 buildings just downstream of Elm St. may be affected by dam-break wave. Depth of flow over Elm St. = 0.7' =
	affected by dam-break wave.
	Death of flow over Elm St. = 0.7' =
	rd downstream reach : From Elm St. to Cross-Section 2
<del></del>	Qp = 3984 cfs (From 2nd reach)
	We Color C reach
! <del></del>	استر وسينها ويرفسنونه والمراجين والمناها والمراجين المناها والمراج المراجية
	Stage in 3's reach when outflow is 3764 ets is El. 26.76
	Stage in 3rd reach when outflow is 3984 cfs is El. 26.96 storage " " at El. 26.96 is 6.3 ac. ff = V,
	$Q_{p_1} = 3984 \left(1 - \frac{6.3}{5.8}\right) < 0 \text{ efs}$
	Stage in 3rd reach when outflow is Octo is El. 25
	Stage in 3rd reach when outflow is Octs is El. 25 Storage . " at El. 25 is O = c-ft = Vz
	$V_3 = \frac{6.3 + 0}{2} = 3.2 \text{ acft}$
L	<del></del>
	<u> </u>
1 1 1 1	Qp3 = 3984 (1 - 3,2) = 1786 cfs
	Stage in 3rd reach when outflow is 1786 cfs is 25.88
	torage " " at El. 25.88 is 2.8 acft. = V4
	Op = 3984 (1-28) = 2061 cfs Outflow from 3rd reach
	We = 0764 ( 5.8) = 6001 cts Withow from 0 reach
	Stage in 3rd reach when outflow is 2061 cfs is 26.0
أستنا فسنطبط والمسادرون	
	No buildings affected by dam-break wave.
	and the transfer of the control of t

CAMP DRESSER & MCKEE INC.	CLIENT COE JOB NO 380-5-/4 PAGE 1066 PROJECT DAM Inspection DATE CHECKED 5/4/77 DATE 41/7/79
	PROJECT Dam Inspection DATE CHECKED 5/4/79 DATE 4/17/79  DETAIL RUSSE// Pond Dam CHECKED BY JED COMPUTED BY PFH
. <	135 (1000) 51007100
	ZE CLASSIFICATION
	Height: Top of dam El. 78.3
	Height: Top of dam El. 78.3  Toe of dam <u>El. 63.3</u> 15.0 ft
	·
<u> </u>	Storage at top of dam:
	Dead Storage (below spillway) 41.3 acre-ft.  Surcharge Storage (to top of dam) 29.7 ocre-ft  71.0 acre-ft
	Surcharge Storage (to top of dam) 29.7 ocre-ft 71.0 ocre-ft
	· · · · · · · · · · · · · · · · · · ·
	. Size Classification: SMALL
<u>-</u> <u></u>	
	M FAILURE A NOLVELE
PA	M FAILURE ANALYSIS
	Qp, = 8/27 Wb \ g \ /0 - ; Let Wb = 80 ft. & /0 = 15 ft.
	ωρ, - 721 γν γ γ - 70 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
	$Q_{p_1} = (\frac{8}{27})(80')(32.2)^{\frac{1}{2}}(15')^{\frac{3}{2}} = 7814 \text{ efs}$
· · · · · · · · · · · · · · · · · · ·	αρ, (, σ, γ, σ,
1	
Fir	st downstream reach: From dam to 1st downstream road
	Stage in 1st reach when outflow is 7814 cls is El. 72.62
	Stage in 1st reach when outflow is 7814 cfs is El. 72.62 Storage " " at El. 12.62 is 22.0 ac. ft. = Vi
	$Q_{P_2} = Q_{P_1} \left(1 - \frac{V_1}{5}\right) = 78(4\left(1 - \frac{22}{71}\right)) = 5393 \text{ cfs}$
	Stage in 1st reach when outflow is 5393 efs is El. 71.69 Storage " I at El. 71.69 is 17.4 ac-ft = 1/2
	V3 = 22 + 17.4 = 19.7-20. ft.
	9.7
	Qp3 = 7B(4(1- 171) = 5646 cfs Outflow from 1st reach
	Stage in 1st reach when outflow is 5646 cfs is El. 71.79
	2 or 3 buildings may be affected by dam-break wave.
	Depth of flow over 1st downstream road = 3.8' =

APPENDIX D-2



## APPENDIX D OUTLINE OF DRAINAGE AREA AND HYDRAULIC COMPUTATIONS

	<u>Page No</u> .
OUTLINE OF DRAINAGE AREA	
Drainage Area Map	D-1
Size Classification, Elevations, Storage Volumes, Dam Failure Analysis	D-2
Test Flood	D-4
Stage-Discharge Capacity	D-5
Stage-Storage-Area Relationships, Stage-Discharge- Storage Curve, Stage-Area Curve	D-6
Surcharge-Storage Routing	D-7



11. Outlet channel downstream of bridge.



12. Down stream face of dam from left abutment.



9. Upstream face of bridge over outlet channel.



10. Downstream face of bridge over outlet channel.



7. Foundation of former downstream mill.



8. Russell Pond upstream of outlet channel.





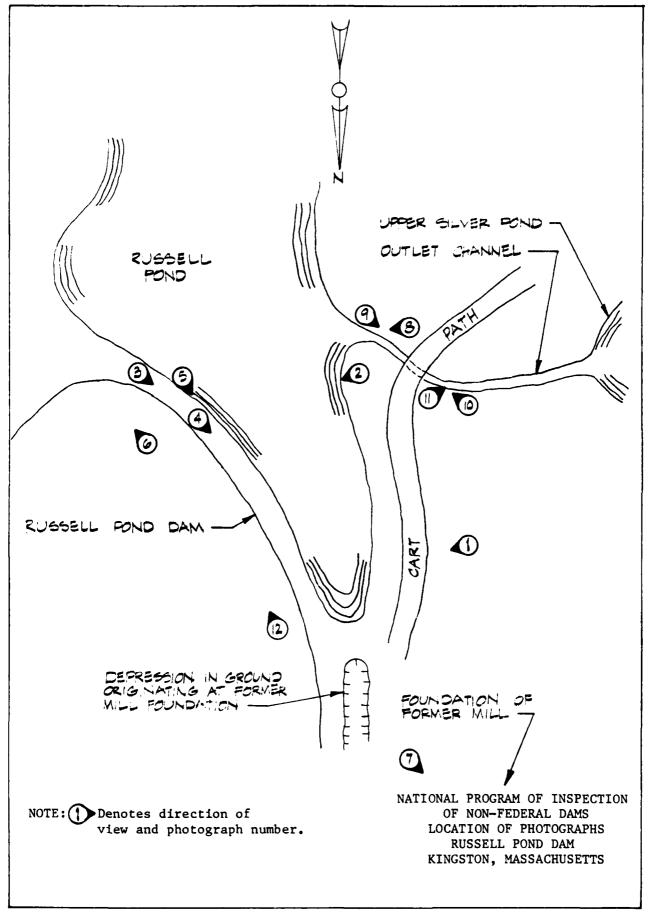
Exposed tree roots and eroded vertical 6. Seepage at toe of dam. portion of upstream face of dam.



3. Dam crest from east abutment.



4. Eroded section in middle of dam crest, looking from east to west.



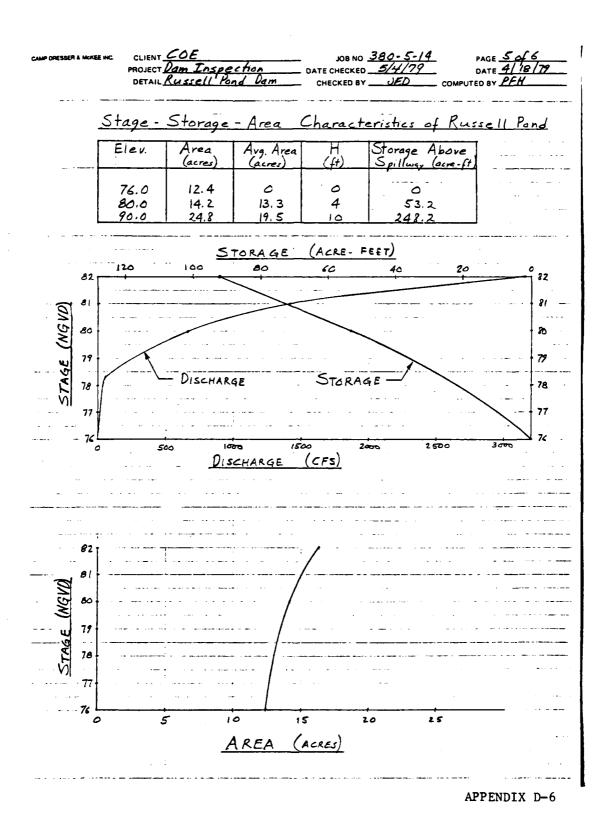
APPENDIX C-1

#### APPENDIX C

#### SELECTED PHOTOGRAPHS OF PROJECT

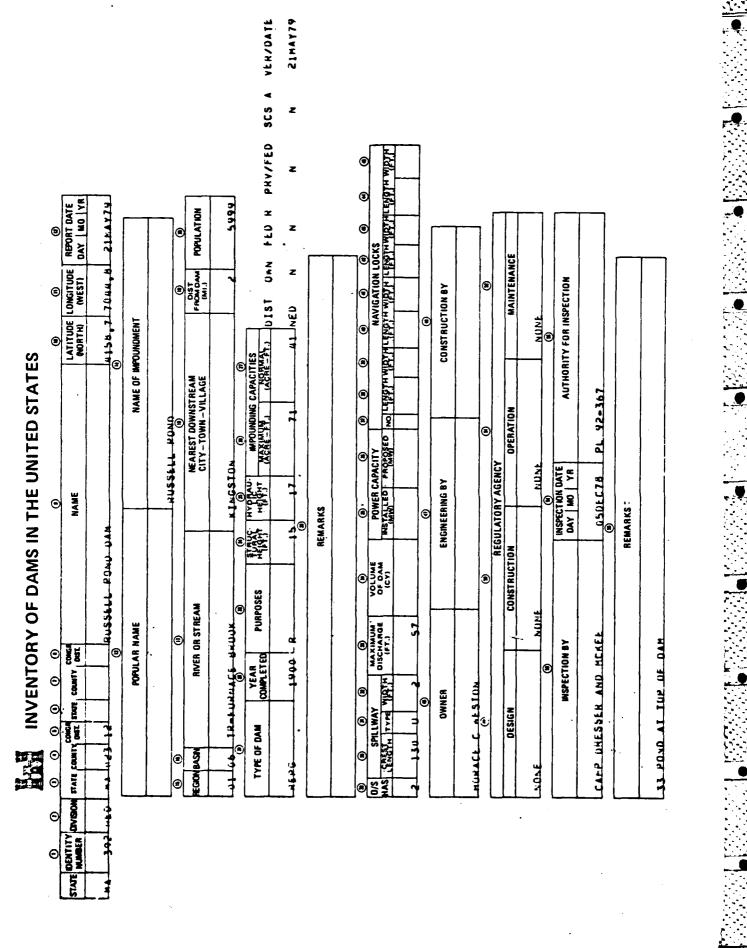
LOCATION PLAN		Page No.
Location of Photographs		C-1
PHOTOGR	<u> AAPHS</u>	
No.	<u>Title</u>	Page No.
1.	Overview Of Upstream Face Of Russell Pond Dam From West Side Of Pond	iv
2.	Overview Of Upstream Face Of Russell Pond Dam From Spillway Area	iv
3.	Dam Crest From East Abutment	C-2
4.	Eroded Section In Middle Of Dam Crest, Looking From East To West	C-2
5.	Exposed Tree Roots And Eroded Vertical Portion Of Upstream Face Of Dam	C-3
6.	Seepage At Toe Of Dam	C-3
7.	Foundation Of Former Downstream Mill	C-4
8.	Russell Pond Dam Upstream Of Outlet Channel	C-4
9.	Upstream Face Of Bridge Over Outlet Channel	C-5
10.	Downstream Face Of Bridge Over Outlet Channel	C-5
11.	Outlet Channel Downstream Of Bridge	C-6
12.	Downstream Face Of Dam From Left Abutment	C-6

<del></del>	o % rural			
B. Is there a storage area or flood plain downstream of dam which could accommodate the impoundment in the event of a complete dam failure				
O. Risk to Life and P	Property in Event of C	Complete Failure		
No. of People				
No. of Homes				
No. of Businesse	9			
	s o Type			
No. of Utilities	Type	Tel Elect & Water.		
Railroads		•		
	0	Silvia Flore Rd.)		
Other Dams				



CAMP DRESSER & MICKEE ING	CLIENT COE PROJECT Dam Inspection DETAIL Russell Pand Dam	JOB NO <u>380 - 5 - 14</u> DATE CHECKED <u>5/4/79</u> CHECKED BY <u>JD</u> COM	PAGE 6 of 6 DATE 4 18 79 PUTED BY FH	
SURCHARGE - STORAGE ROUTING  Op. = Inflow = Test Flood = 113 cfs				
	Stage when outflow is Storage at El. 78.46 Runoff Volume = (0.158 m	113 cfs is El. 78.46 is 32.7 ac.ft. 32.7 ac.ft. i2)(53.3 decft) = 3.9	"runoff = V, -	
$Q_{P2} = Q_{A} \left(1 - \frac{V_{i}}{5}\right) = 113 \left(1 - \frac{3.9^{u}}{5.0^{\circ}}\right) = 25 \text{ cfs}$ Stage when outflow is 25 cfs is El. 77.7  Storage at El. 77.0 is 22.6 acft.				
	Avg. Storage = 32.7 +	22.6 = 27.6 acft.		
	Stage when storage is Outflow at El. 78.10 Test Flood Out		78	
	The test flood outflow	does not overtop	the dam.	

### APPENDIX E INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS



# END

## FILMED

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